**REMARKS**

In view of both the amendments presented above and the following discussion, the Applicants submit that none of the claims now pending in the application is obvious under the provisions of 35 USC § 103. Thus, the Applicants believe that all of these claims are now in allowable form.

If, however, the Examiner believes that there are any unresolved issues requiring adverse final action in any of the claims now pending in the application, the Examiner should telephone Mr. Peter L. Michaelson, Esq. at (732) 530-6671 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Specification amendments

A single amendment has now been made to the specification to correct a minor inadvertent grammatical error that remained in the specification, as filed.

Though the Examiner accepted all the specification amendments made in the Applicants' prior amendment mailed June 8, 2005, the Examiner stated "The corrections to the specification will not be held in abeyance.". Inasmuch as the Applicants have made all those amendments in accordance with current PTO practice, namely by providing appropriately corrected substitute paragraphs -- as the Applicants have also done here with the present amendment to their specification, there appears to be nothing further which the Applicants need to do to effectuate all their specification amendments. If the Applicants are mistaken and the Examiner

requires anything further from the Applicants to enter all these amendments, then the Applicants respectively request that the Examiner so advise the Applicants accordingly.

Drawings

The Examiner also accepted the Applicants' proposed drawing correction, namely the insertion of a missing reference numeral, provided with their prior amendment. To effectuate that correction, the Applicants provided a red-lined drawing sheet showing their proposed correction along with a replacement drawing sheet which incorporated that correction. However, the Examiner stated "The corrections to the drawings will not be held in abeyance.". Inasmuch as the Applicants have made that correction in accordance with current PTO practice, namely by providing an appropriately red-lined drawing sheet and a replacement drawing sheet, here too there appears to be nothing further which the Applicants need to do to effectuate that change. Nevertheless and for the Examiner's convenience, the Applicants have enclosed a copy of the replacement drawing sheet herewith. If the Applicants are mistaken and the Examiner requires anything further from the Applicants to enter the drawing change, then the Applicants respectively request that the Examiner so advise the Applicants accordingly.

Status of claims

None of the claims has been amended or canceled. No new claims have been added.

Rejection under 35 USC § 103

The Examiner has rejected claims 1-13 under the provisions of 35 USC § 103 as rendered obvious by the teachings in the Kracht patent (US patent 6,377,987 issued April 23, 2002 to J. E. Kracht) taken in view of those in the Zeldin et al patent (United States patent 5,708,772 issued on January 13, 1998 to P. Zeldin et al). This rejection is respectfully traversed. To simplify the ensuing discussion, this rejection will be specifically discussed primarily in the context of claim 1.

Specifically, the Examiner opines that the Kracht patent teaches a methodology for determining the topology of a computer network where that topology is built from data relating to discovered devices on the network which includes one or more unresolved branches, and wherein that methodology includes the steps of: for each unresolved branch on the network, attempting to determine the type of each discovered network device on the branch, and if the type of that device is determined to be an endstation, inferring that an undiscovered connecting device is present on that branch. The Examiner concedes that this patent fails to explicitly teach that if the type of at least one discovered network device on a branch is not an endstation type, leaving the topology of that branch unresolved. In light of this failing, the Examiner turns to the Zeldin et al patent. The Examiner takes the opinion that the Zeldin et al patent teaches the concept of scanning an unresolved link to determine if the discovered nodes on a branch are edge devices, destination nodes or source nodes, and then, from the resulting information, determining if only an edge

node, a bridge cloud linking segments or more nodes on that branch exists. The branch node will remain unresolved with a "black box indicator" until the devices on that branch are resolved. Hence, with these teachings in mind, the Examiner concludes that it would have obvious to one of ordinary skill in the art at the time the present invention was made to combine the teachings of the Kracht and Zeldin et al patents to determine network topology from connection data and thus arrive at the present invention. The Examiner believes that the combined teachings would have allowed for more accurate inferences to be made regarding the topology. Hence, it would have been obvious to leave an unresolved branch/segment on the network unresolved if an edge/endstation type of device was not detected on that branch because inferences would indicate that presence of such a type of device; but, until it is actually discovered and resolved, it must remain unresolved.

While the Examiner, in reaching her conclusions, has clearly drawn inferences based on the teachings in these two applied patents, the teachings, when critically viewed, simply stop quite a bit short of supporting those inferences. Hence, the Examiner's view of obviousness is incorrect.

The Kracht patent addresses a technique for discovering and identifying network devices and then determining the physical topology of a network containing those devices. The Kracht patent draws an explicit distinction between endstations and network devices. In col. 1, line 17 et seq, this patent defines endstations as devices that are connected to a network and "primarily

supply or consume information" and network devices as devices that "primarily forward information". This passage states as follows:

> "The devices within a network are often categorized into two classes: endstations such as workstations, desktop PCs, printers, servers, hosts, fax machines, and devices *that primarily supply or consume information;* and network devices such as gateways, switches and routers *that primarily forward information between the other devices.*" [emphasis added]

Why is this distinction important? Because, this patent has no teachings relating to the use of endstations in detecting network topology, rather, in doing so, this patent relies solely on detecting network devices.

While the Kracht patent does indeed teach a methodology for determining network topology, that patent recognizes, as the present Applicants do, the need to detect unmanaged devices on the network (e.g., network devices that do not support the SNMP protocol or MIB (management information base) information). Inasmuch as this is the most salient aspect of the teachings in the Kracht patent to the present invention, the Applicants will focus their discussion of this patent on this aspect.

As generally indicated in col. 4, line 41 et seq the Kracht patent describes a technique for detecting unmanaged, so-called "unidentifiable" devices (ones that do not support SNMP or MIB information otherwise required for identifying themselves; see, e.g., col. 12, line 64 et seq). In general, this methodology relies on the premise that multiple devices can not be linked to a single port of a

network device. Because of this premise -- which is of course true, a discovery mechanism taught by the Kracht patent infers, based on the existence of multiple devices that all observe additional common MAC (media access control) addresses on the same ports through which those devices observe each other, that an intervening unmanaged network device (a so-called "black box device") must exist between these network devices and thus interconnect them.

In that regard and with reference to FIG. 6A and its accompanying discussion in col. 13, line 9 et seq, black cloud device 608 is illustratively situated amongst devices 602, 604 and 606 with each of these latter three devices connected by links 612 to the black cloud device, but none of devices 602, 604 and 606 being directly connected to each other. After an appropriate discovery process has been performed (here being through use of the Cisco Discovery Protocol -- CDP), devices 602, 604 and 606 are identified and viewed as being "neighboring devices" on the network. However, in actuality and due to intervening device 608, devices 602, 604 and 606 are not neighboring devices since none of them are directly connected together. Nevertheless, the discovery process initially concludes based on CDP information that "a single port of device 602 is physically linked to both devices 604, 606, a single port of device 604 is linked to both devices 602, 606, and that a single port of device 606 is linked to both devices 602, 604." Because multiple devices can not be linked to a single port, the methodology taught by the Kracht patent infers that the three known devices are physically linked to an intervening black cloud device, via links 612, and not to each other.

A similar situation with an intervening "black cloud device" is illustrated in FIG. 6B. As discussed in col. 13, line 27 et seq, two known devices 620 and 622 are physically linked, by links 628, to intervening black cloud device 624. Because the black cloud device does not support CDP, resulting CDP information obtained from the two known devices would indicate that these devices are connected to each other when, in fact, they are not. By detecting that devices 620 and 622 "both observe additional common MAC addresses on the same ports with which the devices observe each other", the discovery mechanism determines that these two known devices are linked to intervening black cloud device 624 and not to each other.

With this in mind, the Kracht et al patent discusses in considerable detail in col. 16, line 7 et seq, and with specific reference to the flowchart shown in FIG. 9, its process of generating a network topology, including discovery of unmanaged network devices.

In essence, through blocks 902 and 904, the process first undertakes conventional network discovery through which each network device is identified and a specific network (e.g. IP) address, within a set of network addresses, which is associated with that device is determined. Thereafter, through block 906, the process then enters an information-gathering phase through which it retrieves configuration information from known devices. This configuration information consists of OSI Layers 2 and 3 configuration information and may also include both MAC address information and proprietary discovery protocol information such as CDP information. Since known devices

are those which implement SNMP and/or other network management protocol (including CDP), and endstations do not implement either (let alone CDP which is presumably proprietary to Cisco network devices), then these devices from which configuration information is obtained must, a priori, solely consist of network devices. Network endstations, which have been expressly defined by this patent as devices which primarily supply or consume information, are neither queried nor involved.

Once all the configuration information is obtained, a link processing phase, indicated by block 907, is performed. First, within block 907, block 908 discards any information that has been collected for incorrectly identified known devices. Block 910 then identifies possible neighboring devices, and in doing so can use proprietary discovery protocol (presumably CDP) information that was collected through block 905. Thereafter, block 912 determines which of the possible neighboring devices are actually not neighbors, owing to the existence of intervening non-managed devices. In doing so and as taught in col. 17, line 1 et seq, the process again utilizes MAC addresses and specifically those MAC addresses which have been seen by the non-managed devices:

> "The process then determines what MAC addresses have been seen by the potential problem devices and whether the known devices associated with the MAC addresses indicate that they have multiple neighboring devices from a single physical link. Based on this information, the process cannot only identify the possible neighboring devices that are not actual neighboring devices but also physical links that exist between known devices but are not indicated by the proprietary discovery protocol information."

Thereafter, at block 914, black cloud devices are identified by having observed what MAC addresses occur at each port of the known devices. Thereafter, though blocks 916 and 918, Internet connected devices (routers, gateways etc.), and stacked devices are identified. Finally, though block 920, a network topology, illustrated by that shown in FIG. 8, is generated.

Now, as the Examiner can surely appreciate, the process taught by the Kracht patent does not rely at all on determining network topology by detecting network endstations, and in fact, appears to direct its activities just to processing information obtained from network devices themselves. This is to be expected inasmuch as endstations, by their very nature, do not "*primarily forward information between the other devices*", as defined by the Kracht patent. Thus, endstations, such as PCs, printers, servers and fax machines, are not involved in routing or otherwise directing packet traffic through a network and hence do not implement network management protocols such as SNMP or proprietary network discovery protocols such as CDP. Hence, endstations do not provide network information nor control network management.

Nowhere in any of the passages cited by the Examiner, specifically col. 4, lines 55-60, col. 5, lines 2-7, or col. 12, line 55 through col. 13, line 58, or in Figs. 6A-6C to which the Examiner references, are there any teachings, whether express or even reasonably implied, which would indicate that the process taught by the Kracht patent encompasses network endstations. These portions of

the patent simply do NOT teach as far as the Examiner either believes or would like to believe they do.

Now, as to the Zeldin et al patent, this patent also teaches a methodology for determining network topology, particularly where the network (as indicated in col. 1, line 44 et seq of this patent) contains unmanaged network devices (including network devices which may be managed but do not support or do not respond to SNMP requests; all of which, including unmanaged devices, will simply be referred to hereinafter as unmanaged network devices).

In general, the Zeldin et al methodology also relies on the premise that only unitary connections exist between ports on different network devices, i.e. as defined in col. 6, line 63 et seq, as being a single destination $Nmm_d$ (network management module Nmm) coupled to a single slot/port combination of a specific source $Nmm_s$. The methodology, as noted in col. 2, line 22 et seq in this patent, obtains connection (link) information from source (managed) hubs in the network and iteratively processes that information to first locate and identify all unitary links and then to locate unmanaged devices.

In that regard and as stated in col. 6, line 35 et seq, each "of the Nmm's in the network has determined which other network management modules are in its network and via which slot and which port it has noted each Nmm. ... [E]ach network management module does know with which network management modules it can communicate via requests over each slot/port to which the Nmm's can communicate and respond to requests received from other Nmm's over the same slot/port."

What this means is simply that each Nmm is obviously a managed network device. Hence, the Zeldin et al methodology relies on ascertaining unitary links between managed network devices. Endstations, which by the nature lie at a fringe of a network and not between separate network management modules, are not encompassed by and hence totally irrelevant to the Zeldin et al methodology.

The specific process taught by the Zeldin et al patent is discussed in col. 6, line 30 et seq. This process appears to have two basic sub-processes. The first sub-process determines all managed network devices (here being Nmms) and their interconnections. The second sub-process locates unmanaged network devices situated between any two Nmms.

As to the first sub-process, first a discovery process occurs through which each of the Nmms in a network determines, through SNMP requests and responses, which other Nmms are in the same network and on which of its slots/ports each of the other Nmms appears. This information results in a series of unitary link entries for a table and is provided to a network manager. Once this occurs, process 350 shown in FIG. 3B is then performed. Initially, within process 350, block 355 places all the link entries into a resolved link table. For each link (forward link) in the table from a first Nmm to a second Nmm, block 356 then determines a back path (back link) from the second Nmm to the first Nmm over the same link. Block 357 then places that back link in a "back link" table. Given the unitary nature of links, if there are no unmanaged devices intervening in any forward link, then the forward and back

links will be the same. If this occurs, then both the forward and back links are consolidated in a database and removed from their respective tables by block 358. Process 350 iteratively continues for all the links in the resolved link table until that table is empty or there are entries which have multiple Nmms as their destination IP addresses.

After all the unitary links are found, the second sub-process is performed to locate all unmanaged network devices (so-called "black boxes"). Such a sub-process is indicated by process 1100 shown in FIGs. 11A and 11B and discussed in detail in col. 9, line 41 et seq.

Process 1100 determines the existence of a "black box" basically, as indicated in col. 10, line 3 et seq, through block 1105, by finding any link where its source Nmm equals the destination $Nmm_d$ and coupled through a single slot/link combination, and then, through blocks 1106 and 1107, determining whether that link has its destination $Nmm_d$ equal to the source Nmm for that same slot/link combination. If this link does not have its destination Nmm equal to a scanned-for source $Nmm_s$, or the source Nmm does not equal the $Nmm_d$, then block 1108 establishes that those $Nmm_s$ and $Nmm_d$ are not directly connected. If these two Nmms are not in the same network segment, then an appropriate bridge cloud linking these two Nmms is then inserted, by block 1117, into the network topology, or if the two Nmms are in the same segment, then, through block 1113, a new black box linking those Nmms is inserted into the topology. Alternatively, if the black box has already been

established, then the link is connected, through block 1111, to that box.

Being that the Zeldin et al patent only discerns connections between network management modules, here too, consideration of network endstations is utterly irrelevant. Accordingly, it not surprising at all and in fact quite expected that the Zeldin et al methodology completely ignores the existence of endstations.

In sharp contrast to the teachings of the Kracht and Zeldin et al patents, the Applicants take a very different approach -- one that considers network endstations -- to the task of determining network topology given the existence of unmanaged devices.

Specifically, the present invention attempts to determine the type of each discovered network device on a unresolved branch in a network topology. If the type of each such device on a branch is determined to be an endstation type (i.e., all the child nodes on that branch are connected to endstations), then the present invention determines that an undiscovered connecting device is present on that particular branch and that device, heretofore missing, is flagged as such in the network topology. As discussed in page 10, line 13 et seq of the present specification, various conventional methods exist to identify network endstations, including reading, through Telnet client emulation, an identification string provided by a network endstation; or by using Windows API calls.

Through the inventive technique, unresolved branches are separated into two types: (a) those in which every discovered network device on an unresolved branch is determined to be an endstation type, and (b) those in which at least one of the discovered devices on the unresolved branch is not an endstation type. Should the latter occur, the branch is left unresolved and is so indicated in the network topology.

As noted above, both the Kracht and Zeldin et al patents do not detect endstations and completely ignore their existence. In fact, if the teachings of these patents were to be combined, as the Examiner purports to do, by modifying the Kracht teachings by those in the Zeldin et al patent, then the resulting combination would teach away from the present invention.

In particular, both Kracht and Zeldin et al patents rely on using configuration information concerning the network devices themselves and unitary links between those devices. Specifically, the Kracht methodology first attempts to detect and identify all network devices through configuration information received from those devices. Thereafter, using proprietary discovery protocol information (CDP information), possible non-neighboring network devices are identified. Then, by determining which MAC addresses have been seen by which device, the topological locations of unmanaged network devices are ascertained. Inasmuch as the Zeldin et al patent relies on analyzing connection (link) information to detect unmanaged network devices, then incorporating the Zeldin teachings in the Kracht methodology would simply add a second analytic method through which

unmanaged network devices can be located, i.e. rather than just analyzing the locations at which certain MAC addresses appear, connection information could be used as well.

Inasmuch as both patents are totally silent on considering network endstations, then what the combined teachings would not do is provide any teachings whatsoever relating to detecting network endstations and using their existence to topologically resolve branches in a network map, specifically to locate unmanaged devices thereon.

By virtue of focusing solely on network devices and the interconnection and configuration, the approach dictated by the combined teachings would significantly differ from the Applicants' present invention which considers network endstations. Consequently, it is quite apparent that that approach would teach directly away from the present approach.

Hence, it has remained for the Applicants and only the Applicants to recognize that detecting endstations can be used to resolve branches in network topologies that contain unmanaged devices, and particularly by determining whether the type of each network device on an unresolved network branch is an endstation and, if it is, then an unmanaged device exists on that branch, but, if it is not, then leave that branch unresolved.

None of the cited references utilizes network endstations in such a manner.

Claim 1 contains suitable recitations directed to the distinguishing features of the present invention. Specifically, this claim states as follows, with those recitations shown in a bolded typeface:

> "A method for determining the topology of a network when a network tree, built from data relating to discovered devices of the network, includes one or more unresolved branches, the method comprising:
> for each unresolved branch of the network tree, attempting to determine the type of each of the discovered network devices on the branch;
> **if the type of each discovered network device on the branch is determined to be an endstation type, inferring that an undiscovered connecting device is present on the branch**; and
> **if the type of at least one discovered network device on the branch is not an endstation type, leaving the topology of the branch unresolved."** [emphasis added]

Hence, the Applicants submit that this claim is not rendered obvious by the teachings in the Kracht or Zeldin et al patents, whether taken singly or in any combination -- including that posed by the Examiner. Accordingly, this claim is patentable under the provisions of 35 USC § 103.

Similar distinguishing recitations appear in each of the Applicants' other independent claims, namely claims 11 and 12. Consequently, the Applicants submit that each of these claims is also not rendered obvious by the teachings in these two applied patents for the exact same reasons discussed above with respect to claim 1.

Each of dependent claims 2-8, 10 and 13 recites further distinguishing features of the present invention and

depends, either directly or indirectly, from either independent claims 1 or 12. Accordingly, none of these dependent claims is rendered obvious by the teachings of the Kracht and Zeldin et al patents for the exact same reasons set forth above with respect to claim 1. Hence, all of these dependent claims are also patentable under the provisions of 35 USC § 103.

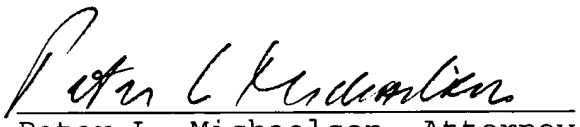
Conclusion

Thus, the Applicants submit that none of their current claims is obvious under the provisions of 35 USC § 103.

Consequently, the Applicants believe that all these claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

Respectfully submitted,

November 11, 2005



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